

NOTE

A New County Record for the Tiger Beetle *Cicindela patruela* Dejean (Coleoptera: Carabidae: Cicindelinae) from West Virginia, with Notes on Habitat and Other Upland Tiger Beetle Species

*Cicindela patruela* Dejean is an uncommon or rare tiger beetle throughout much of its range. As with many rare cicindelid species, *C. patruela* has become the subject of conservation concern in recent years. Extirpations of populations of this tiger beetle have been reported from the District of Columbia, Maryland, and New York (Glaser 1984, McCabe 1995, Mawdsley 2005), and populations are formally protected by state law in Maryland and Massachusetts (Maryland Department of Natural Resources 2003, Massachusetts Division of Fisheries and Wildlife 2004).

West Virginia is one of the few states where *C. patruela* remains fairly common in suitable habitats. Acciavatti et al. (1992) reviewed the tiger beetle fauna of West Virginia and noted that populations of this species could be found “where sandstone strata create natural forest openings, and along woodland roads and at the edges of abandoned sand quarries.” In the latter habitat, they noted that this species could even be “locally abundant.” These authors reported *C. patruela* from nine West Virginia counties: Barbour, Berkeley, Lincoln, Mineral, Monongalia, Pendleton, Preston, Randolph, and Wyoming.

During my first visit to Morgan County in September, 2005, it quickly became apparent that there was ample habitat to support populations of *C. patruela*. The dominant geological features of the county are two ridges, Cacapon Mountain and Warm Springs Ridge, both of which have actively eroding exposures of white sandstones (the Tuscarora and Oriskany Sand-

stones, respectively). Mining of these formations for sand has occurred in Morgan County for at least a century (West Virginia Geological and Economic Survey 2004), and there are several abandoned sand pits and one large active sand quarry just north of the village of Berkeley Springs.

Following these initial observations, I conducted more extensive surveys in May, 2006, which resulted in the discovery of a small population of *C. patruela* along a ridgetop trail near Berkeley Springs. Adults were found basking in sunny spots along several hundred meters of trail. The ridge in this area consists of eroded outcrops of white sandstone. The substrate of the trail consists of unconsolidated fine white sand which had eroded from the bedrock. The principal tree species at the site included *Quercus castanea* Née (Fagaceae) and *Pinus virginiana* Miller (Pinaceae), with *Kalmia latifolia* L. and species of *Vaccinium* (both Ericaceae) present in the understory. Mosses, lichens, and sedges (*Carex* spp., Cyperaceae) were common along the margins of the trail. This population of *C. patruela* was evidently quite small, as the maximum number of adults observed per visit was eight.

The only other tiger beetle present at this site during my visits was the closely related *C. sexguttata* F. In Morgan County, *C. sexguttata* is found in a wide variety of xeric and mesic habitats associated with diverse soil types (clay, sand, cobble, shale, and organic forest soils). It is interesting to note the differences in ecological tolerances between these two species which are very closely related,

according to the latest molecular analyses (Barraclough and Vogler 2002).

During my surveys in Morgan County, I found another upland tiger beetle species, *C. purpurea purpurea* Olivier, only on shale or clay substrates, at sites where *C. patruela* was absent. *Cicindela sexguttata* was consistently found in the same habitats as *C. purpurea*. It is interesting to contrast these findings with my recent observations in the Pine Barrens of New Jersey, where *C. purpurea* is a common associate of the endemic subspecies *C. patruela consentanea* Dejean. In New Jersey, adults of both species are found at approximately the same times of year on sandy substrates, often at the same sites (Mawdsley 2007). Comparison of these observations suggests that different populations of *C. purpurea* may exhibit associations with different substrate types.

I thank Terry L. Erwin who graciously permitted the examination of specimens in the collection of the National Museum of Natural History. Corinne M. Carter accompanied me on trips to West Virginia. Michael A. Valenti provided valuable comments on the manuscript.

#### LITERATURE CITED

- Acciavatti, R. E., T. J. Allen, and C. Stuart. 1992. The West Virginia tiger beetles (Coleoptera: Cicindelidae). *Cicindela* 24(3–4): 45–78.
- Barraclough, T. G. and A. P. Vogler. 2002. Recent diversification rates in North American tiger beetles estimated from a dated mtDNA phylogenetic tree. *Molecular Biology and Evolution* 19(10): 1706–1716.
- Glaser, J. D. 1984. The Cicindelidae (Coleoptera) of Maryland. *Maryland Entomologist* 2(4): 65–76.
- Maryland Department of Natural Resources, Rare, threatened, and endangered animals of Maryland, December 12, 2003. World Wide Web document at <http://dnrweb.dnr.state.md.us/download/rteanimals.pdf> (accessed September 13, 2005).
- Massachusetts Division of Fisheries and Wildlife, Massachusetts List of Endangered, Threatened, and Special Concern species. June 18, 2004. World Wide Web document at <http://www.mass.gov/dfwele/dfw/nhesp/nhrare.htm> (accessed September 13, 2005).
- Mawdsley, J. R. 2005. Extirpation of a population of *Cicindela patruela* Dejean (Coleoptera: Carabidae: Cicindelinae) in suburban Washington, D.C., USA. *Proceedings of the Entomological Society of Washington* 107(1): 64–70.
- . 2007. Ecology, distribution, and conservation biology of the tiger beetle *Cicindela patruela consentanea* Dejean (Coleoptera: Carabidae: Cicindelinae). *Proceedings of the Entomological Society of Washington* 109: 17–28.
- McCabe, T. L. 1995. The changing insect fauna of Albany's Pine Barrens. World Wide Web document at <http://biology.usgs.gov/s+t/noframe/f124.htm> (accessed September 13, 2005).
- West Virginia Geological and Economic Survey. 2004. History of West Virginia Mineral Industries – Sandstone. World Wide Web document at <http://www.wvgs.wvnet.edu/www/geology/geoldvss.htm> (accessed July 18, 2006).
- Jonathan R. Mawdsley, *Research Associate, Department of Entomology, National Museum of Natural History, Smithsonian Institution, P.O. Box 37012, MRC 187, Washington, DC 20013-7012 U.S.A. (e-mail: mawdsley@heinzctr.org)*